CWS: PR: EMM

Publications of the
DEPARTMENT OF COMMERCE
BUREAU OF STANDARDS

Letter
Circular
LC 193

(February 8, 1926)

INFLUENCE OF SHEETING UPON THE
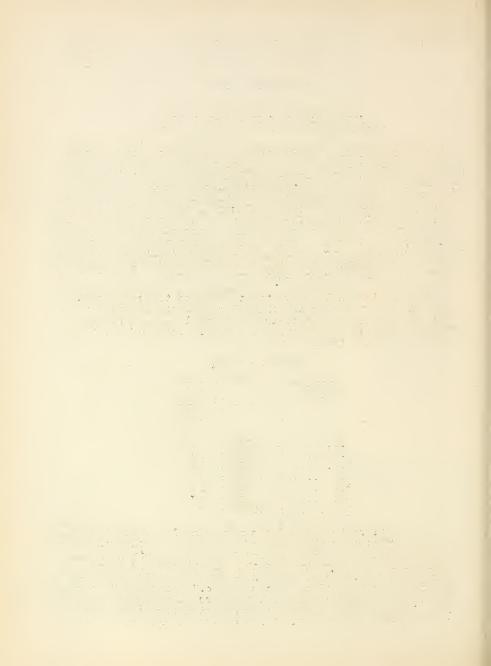## HEAT-RETAINING PROPERTIES OF BLANKETS

The influence of sheeting upon the heat-retaining proper-
ties of blankets has been studied at the Bureau of Standards
in connection with the investigation of the comforting value
of blankets and other textile materials. Previous studies
have shown that the arrangement of the fibers in the material
is the most important factor influencing the ability of the
fabric to retain heat. The question naturally arose as to how
this might be influenced by placing a more closely woven mate-
rial over the blanket. Cotton bed sheeting was selected for
the experiments, since it is used to some extent for this pur-
pose in households, and it was believed that results obtained
would be comparable with other types of spreads and coverings.

The following table shows the results of tests on seven
blankets, both the original thermal resistance (R) (see foot-
note) and the per cent increase in thermal resistance (I)
brought about by the addition of a single layer of sheeting
over one side of the blanket.

Results of Tests

Specimen No.	(R)	(I) per cent
1.........	1110	5
2.........	1090	10
3.........	960	16
4.........	1350	17
5.........	850	18
6.........	790	23
7.........	1080	27

The thermal resistance of the more closely woven blankets
was less affected by the layer of sheeting than that of blankets
of loose weave and high nap. For instance, specimens Nos.1 and
7 originally had approximately the same thermal resistance, yet
after placing a layer of sheeting over the specimens it was
found that the thermal resistance of No.7 increased 27 per cent
and No.1 only 5 per cent. No.1 was more closely woven than
No.7. This result is quite in accord with the proposition
that the heat retaining qualities of textile materials depend

largely on the still air enmeshed within their structure.

The user of blankets will find that sheeting or similarly closely woven materials may profitably be used as a covering for blankets and that such procedure is most effective in the case of blankets of loose low-density construction.

It should be pointed out that the experiments, following the usual procedure, were carried out in still air, and hence correspond closely to the actual case of indoor use. The presence of air currents would doubtless influence the results, but under such conditions the effect of the layer of sheeting should be even more marked.

Note:
Refer to Bureau of Standards Technologic Papers Nos. 266 and 269 for method. The values of (R) in the above table are expressed in degrees c/cal. per 1000 sq. cm per sec. but are not to be compared with the values given in the technologic paper for the following reason. In the formula $R = \dfrac{T_1 - T_2}{H}$,

T_2 was originally taken as the temperature of a thermal junction located at the exterior surface of the test fabric. In computing the above data, however, the temperature of the surrounding air in the room was used as T_2. This change was necessary because the contrasting nature of the blanket and sheeting surfaces rendered the corresponding values of (R), as originally computed, incomparable. It is thought, moreover, that the heat-retaining performance of a blanket in service is most directly expressed in terms of the total temperature drop between the body to be kept warm and the surrounding atmosphere which tends to cool it, regardless of the intermediate local temperatures.